MULTIMEDIA UNIVERSITY

STUDENT ID NO

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# MULTIMEDIA UNIVERSITY

# FINAL EXAMINATION

**TRIMESTER 2, 2017/2018**

## BEF3014 – ECONOMETRICS MODELLING AND FORECASTING

( All sections / Groups )

5 MARCH 2018
9.00 a.m. – 11.00 a.m.
( 2 Hours )

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**INSTRUCTIONS TO STUDENTS**

1. This question paper consists of **FIVE (5)** questions in **FOUR (4)** printed pages.
2. Answer **ALL** questions in the answer booklet provided.
3. Marks are shown at the end of each question.

## Question 1

Recommend an econometric model or a forecasting method with justification if you have the following objectives:

(a) To forecast the trend of crude oil price in Malaysia from 2019 to 2023. (5 marks)

(b) To predict the sales of a departmental store in Kuala Lumpur in 2020. (5 marks)

(c) To forecast Google stock price from 2018 to 2022. (5 marks)

(d) To predict Malaysia Gross Domestic Product in 2019 using household hold debt and exchange currency. (5 marks)

**[Total marks: 20 marks]**

## Question 2

Refer to **Table 1** and **Table 2** for the EViews output of two multiple linear regression models.

**Table 1**
Dependent Variable: Gas Consumption (GC)
Sample: 1997Q1 2006Q4
Included observations: 40

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| Reserves | -0.000208 | 5.89E-05 | -3.525806 | 0.0011 |
| Average Temperature | -52.05708 | 2.899673 | -17.95274 | 0.0000 |
| C | 4489.227 | 173.8851 | 25.81720 | 0.0000 |

**Table 2**
Dependent Variable: Gas Consumption (GC)
Sample: 1997Q1 2006Q4
Included observations: 40

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| Reserves | -0.000210 | 5.91E-05 | -3.549299 | 0.0011 |
| Average Temperature | -51.68713 | 2.936711 | -17.60035 | 0.0000 |
| GDP | -67.86630 | 75.81170 | -0.895196 | 0.3766 |
| C | 4523.820 | 178.5848 | 25.33150 | 0.0000 |

**Continued...**

(a) Based on **Table 1** and **Table 2**, write down the estimated regression of Model 1 and Model 2 respectively, where GC stands for Gas Consumption, AT is Average Temperature and R stands for Reserves. (4 marks)

(b) Given the actual data for reserves, average temperature and GDP from 2006Q4 to 2007Q3 in **Table 3**, compute the point forecast of gas consumption for the period of 2007Q1 to 2007Q4 for Model 1 and Model 2. Round up your answer to 4 decimal points. (4 marks)

**Table 3**

| Period | Average temperature | Reserves | GDP |
|---|---|---|---|
| 2006Q4 | 48.7 | 3,309,616 | 0.37 |
| 2007Q1 | 36.9 | 1,879,155 | 0.02 |
| 2007Q2 | 62.5 | 2,162,255 | 1.18 |
| 2007Q3 | 70.0 | 2,077,496 | 1.08 |

(c) **Table 4** presents the actual data for gas consumption from 2007Q1 to 2007Q4. Compute the mean absolute error (MAE) and root mean squared error (RMSE) for year 2007 and for Model 1 and Model 2. (8 marks)

**Table 4**

| Period | Gas consumption |
|---|---|
| 2007Q1 | 2178.0 |
| 2007Q2 | 643.7 |
| 2007Q3 | 264.7 |
| 2007Q4 | 1370.3 |

(d) Based on your answer in part (c), suggest the model that has the most accurate forecast, and provide a reason for your suggestion. (4 marks)

**[Total marks: 20 marks]**

## Question 3

(a) Using unit root tests, briefly explain the characteristic of data that is appropriate to be used in cointegration test. (5 marks)

(b) Describe the steps in the Engle-Granger (EG) cointegration test using an appropriate example. (10 marks)

(c) Identify a drawback of EG cointegration test that can be overcame by Johansen-Juselius cointegration test. Elaborate on your answer. (5 marks)

**[Total marks: 20 marks]**

**Continued...**

## Question 4

(a) Distinguish between ARCH(1) model and GARCH (1,1) model using appropriate model specifications. (8 marks)

(b) Briefly discuss whether ARCH model or GARCH model is better. (6 marks)

(c) Based on the TARCH EViews output pertaining to a U.S. stock market index named FTSE in **Table 5**, test whether there are asymmetries in the news at 5% significance level. (6 marks)

**Table 5**

Dependent Variable: FTSE
Method: ML - ARCH
Included observations: 2609

| Variable | Coefficient | Std. Error | z-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.000320 | 0.000159 | 2.008853 | 0.0446 |
| FTSE(-1) | 0.058241 | 0.020600 | 2.827250 | 0.0047 |
| Variance Equation | | | | |
| C | 6.05E-07 | 1.66E-07 | 3.636833 | 0.0003 |
| RESID(-1)^2 ($\alpha_1$) | 0.013225 | 0.006335 | 2.087497 | 0.0368 |
| RESID(-1)^2*(RESID(-1)<0) ($\alpha_2$) | 0.049785 | 0.008948 | 5.563688 | 0.0000 |
| GARCH(-1) ($\alpha_3$) | 0.955518 | 0.006066 | 157.5163 | 0.0000 |

**[Total marks: 20 marks]**

## Question 5

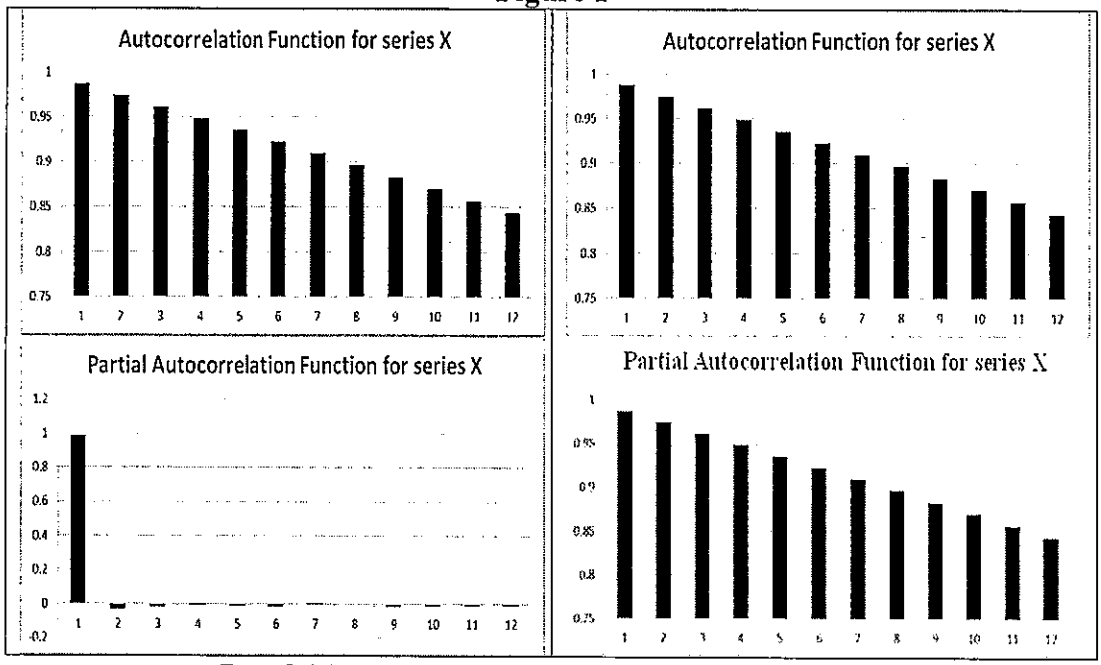
(a) "One must check whether the error term is white noise in an Autoregressive Integrated Moving Average (ARIMA) model before proceeding to forecasting step."

Do you agree with this statement? Justify your answer. (10 marks)

**Continued...**

(b) Figure 1 panel (a) – (b) showed the patterns of autocorrelation function (ACF) and partial autocorrelation function (PACF). Suppose series X is integrated of order of one.

**Figure 1**


Autocorrelation Function for series X
Partial Autocorrelation Function for series X
Autocorrelation Function for series X
Partial Autocorrelation Function for series X

**Panel (a)** **Panel (b)**

Based on Figure 1, suggest an appropriate autoregressive integrated moving average (ARIMA) model with justification for each panel. (10 marks)

**[Total marks: 20 marks]**

**End of Questions**

**Formula Sheet**

Mean Square Error (MSE) $= \frac{1}{n}\sum_{i=1}^{n}\left(Y_{t+i} - F_{t+i}\right)^2$

Root Mean Square Error (RMSE) $= \sqrt{MSE}$

Mean Absolute Error (MAE) $= \frac{1}{n}\sum_{i=1}^{n}\left|Y_{t+i} - F_{t+i}\right|$

**End of Paper**